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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/792,342	03/03/2004	Abaneshwar Prasad	100082DIV3	4543
29050	7590	09/09/2005	EXAMINER	
STEVEN WESEMAN ASSOCIATE GENERAL COUNSEL, I.P. CABOT MICROELECTRONICS COPORATION 870 NORTH COMMONS DRIVE AURORA, IL 60504			VO, HAI	
			ART UNIT	PAPER NUMBER
			1771	
DATE MAILED: 09/09/2005				

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.		Applicant(s)	
	10/792,342		PRASAD, ABANESHWAR	
	Examiner		Art Unit	
	Hai Vo		1771	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 06 July 2005.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-13 and 15 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-13 and 15 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

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1. All of the 102 art rejections are withdrawn in view of the present amendment.
2. The art rejections over West, Jr. (US 2003/0100250) taken alone or in combination with other references are withdrawn.
3. The art rejections over Winings (US 4,239,567) in view of Perman et al (US 5,670,102) are maintained.
4. The art rejections over Xu et al (US 6,406,363) in view of Perman et al (US 5,670,102) are maintained.
5. The obviousness-type double patenting rejections are withdrawn in view of the present arguments.

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.
7. Claims 1-9, 13, and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Winings (US 4,239,567) in view of Perman et al (US 5,670,102) substantially set forth in the 04/06/2005 Office Action. Winings teaches a polishing pad comprising a microcellular polyurethane foam 48. There is no teaching or suggestion that the microcellular foam contains abrasive particles. The microcellular foam is smooth in appearance (column 4, lines 54-55). Likewise, the foam has no surface textures. Winings does not specifically

disclose the void size, porosity, cell density and closed cell structure of the microcellular polyurethane foam. Perman teaches a microcellular foam made from polyurethane having closed cells with a void size of 10 microns, a void volume from 5 to 97% and a cell density about 10^9 voids /cm³ (column 5, line 24, 36, and column 2, lines 33-35, table 1). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to employ the microcellular polyurethane foam having a closed cell structure, a void volume and cell density instantly claimed because such features are known in the microcellular art and Perman provides necessary details to practice the invention of Winings.

It appears that the foam of Winings as modified by Perman meets all the structural limitations as required by the claims. The resulting foam contains no abrasive particles and comprises no externally produced surface texture. The resulting foam has a closed cell structure, a void volume and cell density in the ranges instantly claimed. Therefore, it is not seen that the modified polyurethane polishing pad would have performed differently than the claimed polishing pad in terms of the compressibility, rebound property, hardness and polishing performance, i.e., polishing the silicon dioxide wafer at a rate of at least 600 Å/min with a carrier down force pressure of 0.028 Mpa, a slurry flow rate of 100 ml/ml, a platen rotation speed of about 60rpm, and a carrier rotation speed of about 55 rpm to about 60 rpm. It seems from the claim, if one meets the structure recited, the properties must be met or Applicant's claim is incomplete. This is in

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line with *In re Spada*, 15 USPQ 2d 1655 (1990) which holds that products of identical chemical composition can not have mutually exclusive properties. The same token is applied to the flexural modulus, rheology, glass transition temperature and melt transition temperature of the polyurethane. Like material has like property. It is the examiner's position that the flexural modulus, rheology, glass transition temperature and melt transition temperature would be inherently present. This is also in line with *In re Spada*, 15 USPQ 2d 1655 (1990).

8. Claims 11 and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Winings (US 4,239,567) in view of Perman et al (US 5,670,102), as applied to claim 1 above, and further in view of Ogawa et al (US 6,790,883) substantially set forth in the 04/06/2005 Office Action. Winings does not specifically disclose the polishing pad comprising a water-soluble polymer such as cross-linked polyacrylic acid. Ogawa, however, teaches a polishing pad comprising a polyacrylic acid and a cross-linking agent. Since polyacrylic acid is cross-linkable, therefore, it is not seen that the polyacrylic acid is not cross-linked in the presence of the cross-linking agent. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to employ the water-soluble polymer in the polishing pad motivated by the desire to increase an indentation hardness of the polishing pad, thereby improving the removal rate (Ogawa, column 6, lines 16-25).
9. Claim 15 is rejected under 35 U.S.C. 103(a) as being unpatentable over Winings (US 4,239,567) in view of Perman et al (US 5,670,102), as applied to claim 1

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above, and further in view of Kihara et al (US 6,239,188) substantially set forth in the 04/06/2005 Office Action. Winings does not specifically disclose the polyurethane foam having a bimodal pore size distribution. Kihara, however, teaches a polishing pad made from polyurethane comprising two types of cells having different sizes by adding two types of expanded microspheres with two different particle sizes (abstract). The formation of the two type of cells leads to a large amount of abrasive grains from the slurry to held on the polishing pad, thereby improving polishing performance while reducing scratching of the polished surface (column 5, lines 1-7). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to employ the microcellular foam having a bimodal pore size distribution motivated by the desire to improve polishing performance and reduce scratching of the polished surface.

10. Claims 1-10, 13, and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Xu et al (US 6,406,363) in view of Perman et al (US 5,670,102) substantially set forth in the 04/06/2005 Office Action. Xu teaches a polishing pad comprising a microcellular polyurethane having a cell from 0.1 to 1000 microns encompassing the claimed range (column 4, lines 26-27). Xu teaches that the chemical solution contains no abrasive particles, the polishing pad needs to include abrasive particles (column 3, lines 32-35). Xu teaches the slurry contains abrasive particles (column 3, lines 18-20). Therefore, the abrasive particles are not necessarily contained in the polishing pad itself. Xu

discloses the polishing surface is smooth or textured (column 5, line 31).

Likewise, the foam has no surface textures. The polishing pad further comprises a thermoplastic polymer (column 4, lines 10-15). Xu does not specifically disclose the porosity, cell density and closed cell structure of the microcellular polyurethane foam. Perman teaches a microcellular polyurethane foam having closed cells, a void volume from 5 to 97% and a cell density about 10^9 voids /cm³ (column 5, line 24, 36, and column 2, lines 33-35). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to employ the microcellular foam having a closed cell structure, a void volume and cell density instantly claimed because such features are known in the microcellular art and Perman provides necessary details to practice the invention of Xu.

It appears that the foam of Xu as modified by Perman meets all the structural limitations as required by the claims. The resulting foam contains no abrasive particles and comprises no externally produced surface texture. The resulting foam comprises a polymeric resin as required by the claims. The resulting foam has the cell size encompassing the claimed range. The resulting foam has a closed cell structure, void volume, and cell density within the claimed ranges. Therefore, it is not seen that the polyurethane polishing pad would have performed differently than the claimed polishing pad in terms of the compressibility, rebound property, hardness and polishing performance, i.e., polishing the silicon dioxide wafer at a rate of at least 600 Å²/min with a carrier

down force pressure of 0.028 Mpa, a slurry flow rate of 100 ml/ml, a platen rotation speed of about 60 rpm, and a carrier rotation speed of about 55 rpm to about 60rpm. It seems from the claim, if one meets the structure recited, the properties must be met or Applicant's claim is incomplete. This is in line with *In re Spada*, 15 USPQ 2d 1655 (1990) which holds that products of identical chemical composition can not have mutually exclusive properties. The same token is applied to the flexural modulus, rheology, glass transition temperature and melt transition temperature of the polyurethane. Like material has like property. It is the examiner's position that the flexural modulus, rheology, glass transition temperature and melt transition temperature would be inherently present. This is also in line with *In re Spada*, 15 USPQ 2d 1655 (1990).

11. Claims 11 and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Xu et al (US 6,406,363) in view of Perman et al (US 5,670,102) as applied to claim 1 above, further in view of Ogawa et al (US 6,790,883) substantially set forth in the 04/06/2005 Office Action. Xu does not specifically disclose the polishing pad comprising a water-soluble polymer such as cross-linked polyacrylic acid. Ogawa, however, teaches a polishing pad comprising a polyacrylic acid and a cross-linking agent. Since polyacrylic acid is cross-linkable, therefore, it is not seen that the polyacrylic acid is not cross-linked in the presence of the cross-linking agent. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to employ the water-soluble polymer in the polishing pad motivated by the desire to

increase an indentation hardness of the polishing pad, thereby improving the removal rate (Ogawa, column 6, lines 16-25).

12. Claim 15 is rejected under 35 U.S.C. 103(a) as being unpatentable over Xu et al (US 6,406,363) in view of Perman et al (US 5,670,102) as applied to claim 1 above, and further in view of Kihara et al (US 6,239,188) substantially set forth in the 04/06/2005 Office Action. Xu does not specifically disclose the polyurethane foam having a bimodal pore size distribution. Kihara, however, teaches a polishing pad made from polyurethane comprising two types of cells having different sizes by adding two types of expanded microspheres with two different particle sizes (abstract). The formation of the two type of cells leads to a large amount of abrasive grains from the slurry to held on the polishing pad, thereby improving polishing performance while reducing scratching of the polished surface (column 5, lines 1-7). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to employ the microcellular foam having a bimodal pore size distribution motivated by the desire to improve polishing performance and reduce scratching of the polished surface.

Response to Arguments

13. The art rejections over West, Jr. (US 2003/0100250) taken alone or in combination with O are withdrawn because the combined teachings does not teach or suggest a polishing pad having a cell density as required by the claimed.

14. The art rejections over Winings (US 4,239,567) in view of Perman et al (US 5,670,102) are maintained for the following reasons. Applicants argue that the composite sheet 46 made of a base matrix of polyester fibers and a polyurethane foam surface layer 48 is not a polishing pad. The examiner disagrees. Winings discloses the planar wafer removably mounted on a microcellular polyurethane surface for polishing the wafer (column 4, lines 61-65). Likewise, the microcellular polyurethane foam is a polishing pad. Applicants argue that Perman is improperly combinable with Winings because Perman does not teach or suggest the use of its microcellular foam in polishing pads. The arguments are not found persuasive for patentability because microcellular material is known in the foam art to have a cell density of about 10^9 voids/cm³ or greater. Perman does not need to teach the polishing material. Perman provides necessary details such as cell density of the microcellular foam material to practice the invention of Winings.

15. The art rejections over Xu et al (US 6,406,363) in view of Perman et al (US 5,670,102) are maintained for the following reasons. Applicants argue that Xu does not disclose a polyurethane pad without externally produced texture as required by the claims. The examiner disagrees. Xu teaches the polishing surface of the belt can be smooth (column 5, line 31). Likewise, it is clearly apparent that the polishing pad of Xu is without externally produced texture. Applicants argue that Perman is improperly combinable with Xu because Perman does not teach or suggest the use of its microcellular foam in polishing pads.

The arguments are not found persuasive for patentability because microcellular material is known in the foam art to have a cell density of about 10^9 voids/cm³ or greater. Perman does not need to teach the polishing material. Perman provides necessary details such as cell density of the microcellular foam material to practice the invention of Xu.

16. Applicants have provided two articles "CMP Polishing Pads" and "Chemical-Mechanical Planarization of Semiconductor Materials" as factual evidence to demonstrate that for effective polishing, the pad surface must have both microtexture and macrotexture. The articles have been reviewed and considered. However, they are not found persuasive to overcome the art rejections because both Winings and Xu inventions do not teach or suggest the polishing pads with microtexture and macrotexture, but rather polishing pads without microtexture and macrotexture.

17. The double patenting rejections are withdrawn in view of the present arguments (see page 8 of the 07/06/2005 amendment).

Conclusion

18. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37.CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory

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period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

19. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Hai Vo whose telephone number is (571) 272-1485. The examiner can normally be reached on M,T,Th, F, 7:00-4:30 and on alternating Wednesdays.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Terrel Morris can be reached on (571) 272-1478. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Hai Vo

**HAIVO
PRIMARY EXAMINER**